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ABSTRACT

A study was devised to replicate an earlier study which examined the effects of using color microfiche on achievement in a course on interior home design. The microfiche contained representative slides taken from the class lectures. Subjects, who were 136 college students enrolled in the course, were divided into three groups: Group One was assigned to view the microfiche, Group Two was given the option of viewing the microfiche, and Group Three (the control) was not allowed to view the microfiche. While significant differences between treatment and control groups were not found in the original study, there were significant differences between Groups One and Two (treatment) and Group Three on a one-hour examination during the course. However, differences were only marginally significant on the final examination. There was no correlation between amount of time spent on microfiche and achievement. The findings were considered biased in two ways: subjects in the experimental group had more practice, and not all of the subjects in the treatment groups used the visuals. (SH)

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THE EFFECTS OF USING COLOR MICROFICHE UPON ACHIEVEMENT IN A COURSE ON INTERIOR HOME DESIGN*

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ABSTRACT

Two studies were conducted to evaluate the utility of color microfiche, in an auto-tutorial setting, as an aid in learning visual course content. Subjects for the study were students in various sections of Home Economics 160, The Home and Its Furnishings. The criteria were scores on the visual portions of several examinations. In brief, the design of the two studies was as follows: Some subjects, the treatment groups, were given a chance to examine repeatedly, with microfiche readers, visual material which had been shown previously in class. Other subjects, the control groups, were not allowed this opportunity. During the first study, students with access to the microfiche materials tended to achieve higher scores on the visual portion of the final examination. Students in the experimental group who actually, viewed the microfiche performed significantly better than the control group. One phase of the second study replicated the findings of the first study. When the average grades on the visual portion of an hour examination were compared, there was a significant difference between the control group and the average of the two treatment groups (optional and mandatory users). The treatment groups answered more questions correctly. However, there were no significant differences among the groups for the visual portion of the final examination.

The Effects of Using Color Microfiche
Upon Achievement in a Course
on Interior Home Design

During the spring and fall semesters of 1970, students in Home Economics 160, The Home and Its Furnishings, participated in studies designed to evaluate color microfiche in an auto-tutorial setting as an aid in learning visual course content.

Because of the course content, the instructor in Home Economics 160 relies heavily on color slides during the two one-hour lectures per week to present visual concepts about architecture, interiors and furniture. The four hours of laboratory per week are under the supervision of teaching assistants at which time the students work on problems relevant to the course content.

Basically, microfiche are 4 x 6-inch pieces of film on which the images of the original material are reduced for ease in storage. Retrieval of the information is made possible by the magnification of the images with a microfiche reader. A printer can convert the image to hard copy. This pilot study used the standard 60-image and 98-image microfiche. However, only half of the available image spaces were used for each format because horizonal and vertical slides were intermixed in preparation of the fiche.

Microfiche were developed for The Home and Its Furnishings when students in the course suggested that slides shown by their instructor during the lecture should be made available for independent study. Although the instructor's illustrated lectures were apparently well received, it was hard for the student to study the images at his own speed. Presumably, allowing the student to view again the

illustrations outside of class and at his own speed should produce a better understanding of the various furnishings and their design. Technically, this pilot study was made possible when Eastman Kodak marketed their color microfiche in late December, 1969.

The instructor selected representative slides from his lectures and these were edited to the microfiche format. The slides were sent to Eastman Kodak Business Products Division for copying onto color negative material which was used for the production of the required microfiche. Each set of 40 duplicate microfice cost $75, or approximately 3 cents per recorded image. Ample numbers of these microfiche, along with the study guides and microfiche readers, were placed in the library for independent study.

Although they differed in some details, the study conducted in the fall of 1970 replicated an earlier study conducted the preceeding spring. In both studies students and librarians kept a tally of the amount of time spent in viewing the microfiche. Examination grades, based on the visual content of the microfiche, were used as an index for evaluating the utility of microfiche in facilitating learning. Slides were used by the instructor during the examination to test the student's comprehension of the course material. These slides were similar to the ones previously presented in the lectures and made available in microfiche form in the library.

Method

The first study, during the spring of 1970, utilized five existing laboratory groups totaling 81 students. Two laboratory sections were taught by each of two teaching assistants; the fifth laboratory section was taught by the main instructor. A treatment group of 29 students was formed by randomly selecting a laboratory section from

each of the two teaching assistants. This treatment group had access to the microfiche materials. The remaining 52 students in the other three laboratory groups (the control group) were not permitted to check-out the microfiche materials from the library.

The criterion measure was the visual portion on the final examination (100 pts on 66 slides). The number of mistakes made by each student constituted the criterion score.

During the Fall, 1970 study 136 students were included in the existing laboratory groupings. The students were divided into three groups consisting of two laboratory sections each. The first group, made up of 43 students, was assigned to use the microfiche during the semester. For Group Two, with 42 students, use of the microfiche was optional. They could use them if they wanted to but they were not required to as was Group One. Group Three was composed of the 51 students who were not permitted to check out the microfiche from the librarian during the semester. The three groups were formed so as to minimize any potential instructor effect. The criterion measures were the visual portions of the second hour exam (65 points on 25 slides) and of the final exam (61 points on 45 slides). The number of correct responses made by each student constituted the criterion scores.

Results and Discussion

As Table I indicates, for the spring semester group there was no significant difference between the mean number of mistakes made by the microfiche users group and the control group. However, three aspects of the data suggested an additional analysis. First, the experimental group made fewer errors. Second, the probability level approached significance. Third, nearly one third of the experimental group did not use the microfiche facilities. When the actual microfiche users were compared

with the control group, it was found that the users made significantly fewer errors (again see Table I). This finding must be tempered because of a natural selection process which might have occured. Perhaps, the best and most highly motivated students elected to use the microfiche. Some limited data are available to support this conjecture. The mean of the non-microfiche users in the experimental group was 49 mistakes as contrasted with the mean of nearly 39 mistakes in the control group.

When the study was replicated in the fall of 1970, an optional microfiche users group was included in the design. One reason for this additional treatment was to make the compulsory microfiche users treatment stronger in the sense that all subjects in that group supposedly would use the microfiche materials. This goal was not completely realized. Prior to the second hour examination, four of the 50 subjects in the mandatory use group did not check out the microfiche materials. Similarly, prior to the final examination, five students did not avail themselves of the microfiche visuals. However, by comparison 10 of the 21 subjects in the optional use group had not checked out the microfiche materials before the second hour examination. The situation deteriorated by final examination time, when only 8 of the 22 subjects in the optional users group had used microfiche visuals.

Table 2 presents the means and standard deviations of the three comparison groups on the two criteria of second hour and final examinations. As Table 3 reports, there was a significant difference among the means ($\underline{P} < .01$). To probe further the cause of the significant overall F ratio, several Scheffe' comparisons were made. First, the average of the optional and mandatory microfiche users was found to be significantly greater than the average score of the control group ($\underline{P} < .05$). Second, the mandatory users group tended to do better than the control group ($.10 < \underline{P} < .25$). However, the Scheffe' is a very conservative test so that these results

may be considered as approaching statistical significance. Third, there was no significant difference between the mandatory and optional users group ($P > .25$).

One might ask about the linear relationship between time devoted to using microfiche materials and examination scores. Correlations bearing on this question are reported in Table 4. None of the correlation was statistically significant ($P > .05$).

Although on the final examination the means of the mandatory and optional users groups exceeded the mean of the control group (see Table 2), the overall F ratio from an analysis of variance was insignificant by the usual standards (see Table 5). However, in the light of similar results for the other analyses, a probability level of less than .10 might be considered marginally significant. At any rate, the evidence did not indicate that microfiche users did less well than non-users.

Conclusions

During the spring study students having access to the microfiche sets tended to achieve higher scores on the visual portion of the final examination. Students in the test group who actually used the microfiche performed significantly better than the control group who did not use the microfiche materials.

One phase of the fall study supported the findings of the spring semester. When the average grades on the visual portion of the second hour examination were compared, there was a significant difference between the group not having the microfiche and the other two groups. However, there were no significant differences among group means for the visual portion of the final examination.

Obviously, the findings were biased in at least two ways. First, testing on the criterion, using the same visuals as on the microfiche,

means that the subjects in the experimental group had more practice. Second, all subjects in the treatment condition (Spring 1970) and in the mandatory users condition (Fall 1970) did not use the visuals. Seemingly, there was some self-selection among subjects.

As it should have been, students assigned to the microfiche on a mandatory basis tended to use microfiche more than if it was optional. However, there was no significant correlation between the amount of time spent on the microfiche and the grades. There was some tendency for students with optional access to the microfiche to have grades as high as those required to study the microfiche.

All students answering descriptive questions about the microfiche on their final exam agreed that the microfiche materials allowed them to retrieve the visual materials presented in the course at their own rate of study. The respondents also indicated that the microfiche helped them to prepare for their exams and to understand the visual concepts presented in class. A few admitted that their class notes were quite sketchy and that the microfiche helped them to make more complete notes. Parenthetically, several respondents requested a more adequate study guide to make it easier to study the microfiche. Respondents indicated no mechanical problems in use of the microfiche materials. This confirms the librarian's observation that the students found the microfiche an easy and convenient medium for study.

TABLE I

Two Comparisons, Involving Different Combinations of the Same Data,[a] Between Microfiche and Non-Microfiche Users for the Visual Identification Portion of the Final Examination (Spring Semester)

Comparison Groups	$\bar{X}$	S.D.	N	t	p
Mircrofiche Treatment Group	35.21	15.06	29	1.25	<.15
Control Group	38.79	10.63	52		
Actual Microfiche Users	29.00	12.76	20	3.31	<.01
Control Group	38.79	10.63	52		

a. Data are expressed in terms of the number of mistakes.

TABLE 2

Means and Standard Deviations of Three Groups (Mandatory Microfiche Users, Optional Microfiche Users, and Non-Users) for Second Hour and Final Examination Scores[a]

(Fall Semester)

Group	Examination					
	Second Hour					
	N	X	S.D.	N	X	S.D.
Mandatory Users	43	53.60	4.42	44	51.91	5.84
Optional Users	42	54.62	3.99	45	51.02	5.17
Non-Users	51	51.08	4.10	50	49.44	5.72

a. Data are expressed as number of correct responses.

TABLE 3

Analysis of Variance for the Effects of Using Microfiche on Second Hour Examination Scores (Fall Semester)

Source	DF	SS	MS	F	P
Between Treatments	2	179.45	89.72	5.15	< .01
Within Treatments	133	2317.48	17.42		
Total	135	2496.93			

TABLE 4

Correlations between Study Time Using Microfiche Materials and Examination Scores

Group	Examination			
	Second Hour		Final	
	N	r	N	r
Mandatory User	38	.022	35	.297
Optional User	27	.064	19	-.161
Both Mandatory and Optional Groups Combined	65	.139	54	.103

TABLE 5

Analysis of Variance for the Effects of

Using Microfiche on Final Examination

Scores (Fall Semester)

Source	DF	SS	MS	F	P
Between Treatments	2	148.22	74.11	1.88	> .05
Within Treatments	136	5348.93	39.33		
Total	138	5497.15			